FLORENCE COPPER INC.

FLORENCE COPPER INC.
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January 21, 2019
File No. 132473-003

Mr. David Albright
U.S. Environmental Protection Agency
Region 9, Ground Water Office, WTR-9
75 Hawthorne Street
San Francisco, California 94105-3901

Re: Plan for Part II.B Demonstration of Mechanical Integrity at the Production Test Facility
Underground Injection Control Permit No. R9UIC-AZ3-FY11-1
Florence Copper Project, Florence Arizona

Dear Mr. Albright:

Florence Copper Inc. (Florence Copper) is currently operating the Production Test Facility (PTF) in Florence, Arizona. In accordance with the site Underground Injection Control (UIC) Permit No. R9UIC-AZ3-FY11-1 (Permit) and the *Conditional Authorization to Commence Injection for the Production Test Facility* letter dated 14 December 2018, Florence Copper will conduct Mechanical Integrity Testing (MIT) demonstrations. This document includes the plan for conducting the required demonstrations.

External Mechanical Integrity Testing Procedures

The Part II MIT demonstration requirements in Part II.E.3(a)(ii)(B) of the Permit require Florence Copper to conduct differential temperature logging and radioactive tracer (RAT) surveys at all PTF wells. The RAT survey can only be conducted on a well that is actively injecting, so this test will only be conducted on the four PTF injection wells. Testing will be conducted according to Region 9 guidance documents where possible and where the procedures are applicable.

Temperature Decay Logging:

Temperature decay logging will be conducted on all permitted Class III wells at the PTF, this includes injection, recovery, observation, Westbay, supplemental monitoring, and operational monitoring wells. All downhole equipment will be removed from wells prior to conducting the temperature decay logging except for the Westbay equipment which cannot be removed. All surveys will be conducted by a borehole geophysics contractor subcontracted to Florence Copper.

For the injection wells, the injection tubing and packers will be removed from the well and the well will be shut-in for 12 hours prior to commencement of the temperature logging. For the remaining PTF wells, the equipment will be removed from the well (except for Westbay equipment), the water level will be

confirmed to be at static condition prior to conducting the initial temperature survey. Because the pumping, observation, and monitoring wells are not being actively used for injection and are not subjected to induced pressure changes, they will not be shut in prior to temperature logging.

The procedure for the temperature decay logging is as follows:

1. Set-up logging truck at the wellhead. Tooling will consist of a temperature tool, dual gamma ray (GR) detectors (as needed), and casing collar locator (CCL). Tools can be combined based on logging contractor specifications. Load the logging tool(s) into the lubricator, open the master wellhead valve, and begin temperature logging as follows:
    a. The tool will be run downward at a rate of 20 to 50 feet/minute (recommended speed is approximately 30 feet/minute).
    b. Other recording tracks will include:
        i. Depth and logging speed;
        ii. GR or spontaneous potential curve for lithologic correlation (if data exists for the well it will be used rather than collecting new data); and
        iii. CCL.
2. The temperature log will be recorded with depth on a vertical scale of 1 or 2 inches = 100 feet and temperature on a horizontal scale of 5 degrees Fahrenheit (°F) per inch (1°F per log scale division). The logging tool will be run from the water level to the total well depth. Note that a differential temperature track may be added to the final log following data processing by the logging contractor.
3. Tag total depth and perform a correlation check and depth adjustment relative to the packer setting depth using the CCL, and then pull tool up to surface and repeat Step 1 to perform the second temperature logging operation, after a minimum of 4 hours has elapsed since the start of initial temperature logging.

The two temperature surveys and the differential between the two surveys at each well will be plotted on a log along with gamma survey or spontaneous potential data from the well being evaluated and will be analyzed for any anomalies that may indicate fluid movement is occurring behind the well casing.

RAT Survey:

A RAT survey will be conducted at each injection well using Iodine-131 (I-131) tracer. The procedures to conduct the RAT survey are as follows:

1. Equip the wellhead with the lubricator and set up the logging truck on the well.
2. Set up the dual-detector RAT tool with ejector port (used to release and measure the I-131 tracer).
3. Pressurize lubricator and open master wellhead valve.
4. Confirm well is injecting solution at the maximum practicable rate (not to exceed maximum allowable injection pressure) that allows for proper RAT profiling, with at least three slug-catching well profiles.
5. Lower logging tool at maximum safe line speed to measured total depth (collected during temperature survey).
6. Run pre-test baseline GR survey from total depth upward to the injecting water level. The recommended logging speed is approximately 30 feet/minute, and GR scale will be determined by tool response and formation characteristics.

7. Lower the logging tool to the top of the injection zone and record a GR statistical check for 5 minutes.
8. Re-position logging tool to 50 feet above uppermost screened/perforated interval and record a statistical check for 5 minutes.
9. Re-position the logging tool to 100 feet above the injection zone top (inside injection tubing).
10. Ensure that the process water injection rate listed in Step 4 above is established, and release I-131 tracer slug and verify passage of slug with dual detectors.
11. Immediately lower the logging tool detectors below the slug and log upward at 60 feet/minute until the slug is completely passed. Log up to initial slug release depth at 100 feet above the top of the injection zone.
12. Lower logging tool and lower detector back down below the slug and log upward at 60 feet/minute until the slug has completely passed and the detector reaches the previous depth where the slug was caught.
13. Repeat Step 12 until the RAT slug is fully dissipated from the borehole or is no longer moving and dissipating, and a representative profile is obtained of injection flow down the well and into the injection zone. If the initial injection rate is too high to enable accurate flow profiling (minimum of three slug catches), then reduce the injection rate as needed. If the flow can be increased and still allow for accurate flow profiling of at least three slug catches, then increase the flow rate accordingly.
14. Repeat Steps 10 through 13 for repeat profiling of I-131 tracer slug.
15. Re-position the logging tool at 100 feet above the top of the injection zone and increase injection rate to normal plant conditions (as long as flow is not so high that it could pump logging tool loose from wireline socket). Release second I-131 slug (verifying passage of slug with detectors) and then lower detector to a depth below the bottom of the injection tubing and wait for slug arrival, then lower detector to 50 feet above uppermost screened/perforated interval and wait for slug passage. Once slug passes, use the travel time from previous catch depth below injection tubing to calculate 3t (where t is the round-trip iodine tracer slug travel time from the detector depth at 50 feet above the uppermost screened/perforated interval, down to the top of the screen/perforations, and back to the detector [100 feet round trip]), and monitor in time-drive for at least 3t. If the slug is detected, profile upward to ensure that it does not reach the top of the permitted injection zone.
16. Re-position the tool at total depth and log post-test (final) GR survey upward to a depth of 100 feet above the injection zone top at a recommended logging speed of approximately 30 feet/minute using the same pumping conditions as used during the pre-test baseline survey in Step 10.
17. Compare logs from pre-test baseline survey from Step 6 and final survey from Step 16 to determine mechanical integrity.
18. If RAT survey results are normal, then complete tracer velocity shots in the screened/perforated interval, discharge remaining RAT material, pull tool to surface, and clean-up site.

Reporting

The temperature, RAT, and velocity shot survey data will be stored electronically (in Excel format) in addition to the hard copy logs, PDF files, and LAS files. The results of the test including the logs generated by the logging contractor(s) will be transmitted to the U.S. Environmental Protection Agency (EPA) with a summary of the results.

If any deficiencies are identified during the testing activities the EPA will be notified immediately.

Please contact me at 520-374-3984 if you require any additional information.

Sincerely,
Florence Copper Inc.

Daniel Johnson
Vice President – General Manager

cc: Maribeth Greenslade, Arizona Department of Environmental Quality